



# Blockage of Sulfur Colloid Migration on Lymphoscintigraphy and Intravascular Focus on FDG PET/CT Secondary to an Occluded Hemodialysis Fistula

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## Abstract

An unused, occluded arteriovenous fistula may pose an imaging pitfall and interpretive dilemma. On lymphoscintigraphy for the axillary sentinel node mapping in a 51-year-old man with newly diagnosed sebaceous carcinoma of the left forearm and an unused arteriovenous fistula for previous hemodialysis in the left arm, sulfur colloid migration was blocked in the fistula site due to disruption of lymphatic draining. Postoperative FDG PET/CT demonstrated an intravascular focus within the cephalic vein of the left distal arm. Subsequent duplex ultrasound showed an occluded hemodialysis fistula in the left arm, without evidence of tumor thrombosis. The focus of FDG activity within the cephalic vein was from the thrombus in the occluded fistula.

**Keywords:** FDG PET/CT; Lymphoscintigraphy; Arteriovenous fistula

## Case Presentation

A 51-year-old man with history of kidney transplantation was diagnosed as sebaceous carcinoma of the left forearm by incisional biopsy of a growing skin lesion. He had hemodialysis *via* the arteriovenous (brachial artery-cephalic vein) fistula of the left arm 20 years ago. A pre-surgical lymphoscintigraphy for the axillary sentinel node mapping was obtained with intradermal injection of 0.5 mCi Tc-99 m filtered sulfur colloid on the proximal margin of the left forearm lesion. The image demonstrated focal activity in the left distal arm but no radiotracer migration to the left axilla (Figure 1). The focus located in the unused arteriovenous fistula site of the left distal arm when a radio-maker was applied. Re-injection of sulfur colloid proximal to the fistula site was not performed upon the referring surgeon's decision.

The patient underwent radical resection of the lesion of the left forearm and axillary node dissection. Surgical pathology of the left axillary lymph nodes was negative for tumor spread or metastasis.

One month postoperatively, a whole-body FDG PET-CT was obtained for restaging. Combined PET-CT was performed using a PET-CT scanner (Discovery LS, GE Healthcare, Milwaukee, Wisconsin, USA) and standard techniques. The patients had fasted for at least 6 hours prior to

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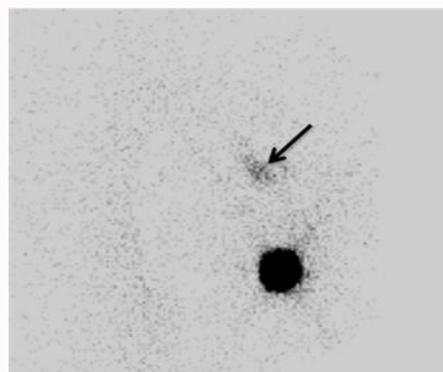
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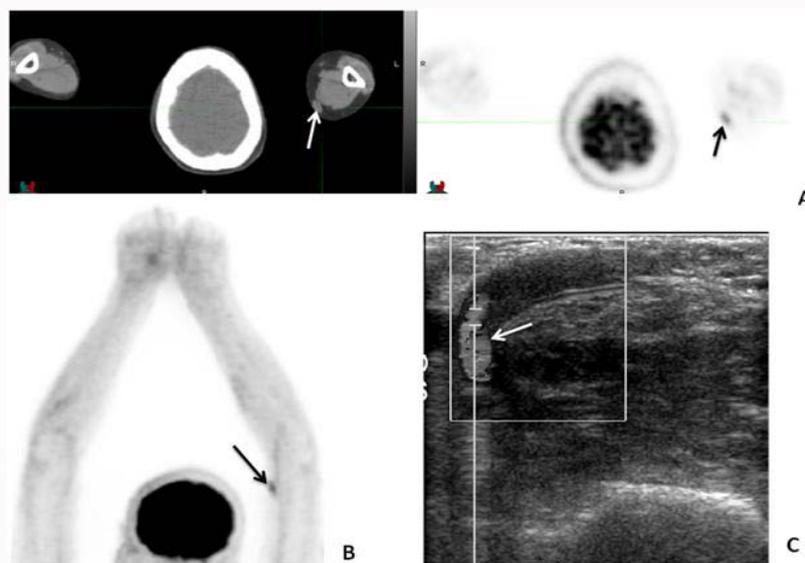
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**Figure 1:** Pre-surgical lymphoscintigraphy for the axillary sentinel node mapping. There was no radiotracer migration to the left axilla. The focus was located in the unused arteriovenous fistula site of the left distal arm when a radio-maker was applied (arrow).



**Figure 2:** FDG PET/CT and duplex ultrasound of the arms. Axial PET/CT (A) and maximum intensity projection (B) images showed an intravascular focus within the cephalic vein of the left distal arm (arrows). A subsequent duplex ultrasound (C) demonstrated an occluded hemodialysis fistula in the left arm, without evidence of tumor thrombosis (arrow).

examination and their blood glucose level was less than 200 mg/dL. The patients received oral but not intravenous contrast media. Spiral low-dose CT (80 mA, 140 kV and 4 mm section thickness) was performed with the cranio-caudal direction covering the areas from the vertex to the toes for the purpose of attenuation correction and anatomic localization. Thereafter, emission scan was conducted in a reverse direction.

FDG PET/CT showed an intravascular focus within the cephalic vein of the left distal arm (Figure 2). The focus reappeared on a repeated FDG PET/CT 5 months later (not shown). A subsequent duplex ultrasound demonstrated an occluded hemodialysis fistula in the left arm, without evidence of tumor thrombosis (Figure 2).

## Discussion

Arteriovenous fistula is an abnormal communication with shunting of blood from an artery to a vein. Functional or nonfunctional arteriovenous fistula after kidney transplantation is associated with complications, one of which is thrombosis with or without thrombophlebitis [1-5]. Imaging plays a role in diagnosis of the fistula-related complications, and there were two clinical observations about evaluation of arteriovenous fistula infection using FDG PET/CT [2,6]. But potential imaging pitfall resulted from the unrelated arteriovenous fistula was not reported in the literature. In this case, blockage of sulfur colloid migration on lymphoscintigraphy was due to disruption of lymphatic draining in the fistula. The focus of FDG activity within the cephalic vein was from the thrombus in the occluded fistula. Although partial paravenous injection of the radiotracer could cause hot spot in the vessel and lung [7,8], it was unlikely in this case because FDG was administered intravenously in the contralateral right antecubital fossa, and the focus was repeatedly seen within the cephalic vein of the left arm on two consecutive PET/CT scans. The case highlights the imaging pitfalls related to

the unused, occluded arteriovenous fistula. The first, if the fistula is on the route of lymphatic draining from the region of interest on lymphoscintigraphy, blockage of migration of sulfur colloid can cause false-negative localization of sentinel node. The second, a radiotracer may retain within the thrombus of occluded fistula after peripheral intravenous injection, which may be seen as a hot intravascular focus and can result in an interpretive dilemma or false-positive finding on scintigraphic images including PET/CT.

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